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ABSTRACT

In order to evaluate vocational agriculture education in 21 Connecticut high schools for the purposes of developing or updating curriculums, this study intended to: (1) determine employment rates of vocational agriculture graduates in agricultural areas, (2) determine post-secondary educational attainment levels, (3) determine variables affecting income levels for each graduating class, and (4) compare income, education, and employment classifications. Data obtained from high school vocational agriculture graduating classes of 1961, 1964, 1967 and 1970 by means of a mail questionnaire and 20 interviews revealed that: (1) enrollment has doubled from 1961 to 1970, (2) post-secondary education was positively correlated with the level of income and (3) about ten percent of the vocational agriculture graduates attended a 4-year college. Multiple regression analysis supported the hypothesis that the mean salaries of persons employed in the non-farm sector were higher than those working on the farm. An analysis of variance substantiated the fact that work experience is positively correlated to higher income levels. Although most students value the FFA, the 1970 survey showed that many respondents felt that FFA become impersonal and has ignored new fields related to agriculture. (AG)

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Education, Employment and Income of High School Vocational Agriculture Graduates

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VT 020093

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TABLE OF CONTENTS

Page

I. Introduction 2

II. Objectives of the Study 3

III. Description of Procedures 4
A. The Sample 4
B. Quantitative Analysis 7

IV. Results 8
A. Education In and Beyond High School 8
B. Current Employment and Current Income 10
C. Relationship of Employment to Vocational Agriculture Education . . . 11
D. Statistical Data and Interpretations 17

V. Future Farmers of America (FFA) 23

VI. Personal Interviews 24

VII. Summary and Conclusions 27

VIII. Bibliography 30

IX. Appendices 31
A. Statistical Notes 31
B. Exhibit of Questionnaire Form 34
C. Map of Cooperating High Schools 40

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EDUCATION, EMPLOYMENT AND INCOME OF HIGH SCHOOL VOCATIONAL AGRICULTURE GRADUATES

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Research Report 39

EDUCATION, EMPLOYMENT AND INCOME OF HIGH SCHOOL VOCATIONAL AGRICULTURE GRADUATES

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June 1972

I. Introduction

The Smith-Hughes Act was passed in 1918 in order to provide additional education for those interested in finding productive employment in agriculture and related industries. In Connecticut, little is known about the employment history of vocational agriculture graduates since the only studies which have been conducted have been of persons who have been out of school only one year. This study was undertaken to provide information to fill the gap. The results should permit an evaluation of how well vocational agriculture training is meeting the purposes of the original act.

The National Vocational Education Act of 1963 and Vocational Amendments of 1968 for the first time permitted Federal funds to be used in training programs for off-farm agricultural occupations but for which a foundation in agriculture was essential. Changes have been made in the Connecticut vocational agriculture offerings as a result of this legislation. In order to determine whether employment patterns have changed as a result of curriculum changes, it is necessary to compare recent graduates with those of previous years. The present study was therefore designed to

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cover graduates of the years 1961, 1964, 1967 and 1970. Students from all 21 high schools offering vocational agriculture were surveyed.

In addition to obtaining an employment history data was obtained on income and education beyond high school. The income data included both the annual growth rate and the starting salary.

The relation of high school courses to later specialization for those continuing their education beyond high school is a question of some importance. Many students continue their education beyond high school even though preparation for college is not the purpose of the vo-ag program. This study was designed to obtain data regarding the extent and kind of post-high school education.

The findings should be of use to those who formulate educational policies in agriculture both at the secondary and college level. In addition, it should be a benefit and guide to those who wish to do further research in the area of vocational agriculture.

II. Objectives

To assess the practical implications of a high school vocational agriculture education and to seek out any potential need for the development of new or revision of existing instructional programs, have been the guiding thoughts of this study. In line with these general ideas, the study had the following specific objectives:

1) to determine the extent to which vo-ag graduates are employed in agriculture and related industries as compared to other industries.

2) to determine the level of education following high school for each particular graduating class.

3) to determine the characteristics that have a significant effect on the level of income for each particular graduating class.

4) to compare the incomes of groups with different levels of education and different employment classifications.

III. Description of Procedures

A. The Sample

A list of vocational agriculture graduates was obtained from all of the high schools offering vocational agriculture in the years of 1961, 1964, 1967 and 1970. The high schools included in the study together with the number of respondents by years are shown in Table 1. For purposes of clarification, a graduate was defined as a student who completed one or more years of an approved agricultural program and was enrolled in vocational agriculture at the time of graduation.

Funds did not permit personal interviews of the entire sample, hence, the study depended heavily upon a mail questionnaire.

The questionnaire was designed to cover three basic areas. (See Appendix B). One, education in and beyond high school, two, current employment and income, and three, the relationship between employment status and vocational agriculture education.

Twenty personal interviews were conducted, selected from those who responded to the questionnaire, in order to obtain additional information on the value respondents placed upon their high school training. Those interviewed included various graduates representing diversified views on the curriculum, and different fields in terms of present employment and education.

Table 1

Number of Vocational Agriculture Graduates by High School for the Years 1961, 1964, 1967 and 1970

	Name of School	Town	Graduating Class 1961	1964	1967	1970	Total
1.	Enfield	Enfield	10	2			12
2.	E. O. Smith	Mansfield		4	8	14	26
3.	Glastonbury	Glastonbury	4	5	7	6	22
4.	Housatonic Valley Regional	Canaan	1	5	9	14	29
5.	Killingly	Killingly	4	16	8	9	37
6.	Ledyard	Ledyard				7	7
7.	Lyman Hall	Wallingford	6	21	26	19	72
8.	Lyman Memorial	Lebanon		3	4	1	8
9.	Nathan Hale-Ray	East Haddam	10	6	7	7	30
10.	New Milford	New Milford	2	5	4		11
11.	Nonnewaug Regional	Woodbury	7	8	14	13	42
12.	Norwich Free Academy	Norwich	6	3	2	6	17
13.	Rockville	Vernon	3	10	9	18	40
14.	Southington	Southington	2	7	9	16	34
15.	Suffield	Suffield			10	12	22
16.	Tourtellotte	Thompson	1				1
17.	Trumbull	Trumbull				14	14
18.	Windham	Windham	7				7
19.	Wamogo Regional	Litchfield	6	9	13	22	50
20.	Woodrow Wilson	Middletown	9	9	5	14	37
21.	Woodstock Academy	Woodstock	4	4	5	2	15
	Total Number of Graduates		82	117	140	194	533
	Total Number of Schools		16	16	16	17	

The total sample size and the number of respondents and non-respondents are shown in Table 2. A 51 percent sample was obtained if the "address unknown" category is excluded. This is a high response for any mail questionnaire even though three mailings were conducted.

Table 2

Number of Respondents and Non-Respondents

	Replied	Current Military Service[a/]	Address Unknown	No Response	Total
1961	32	0	14	36	82
1964	61	0	10	46	117
1967	57	4	11	68	140
1970	103	6	6	79	194
TOTAL	253[b/]	10	41	229	533

a/ Persons in military service who did not fill out the questionnaire.
b/ Figures may not tally between tables because some questionnaires were partially invalidated due to lack of information.

Graduates from the vocational agriculture program doubled in number from 1961 to 1970.[1/] This could stem from an increase in total enrollment in high school with the percentage studying agriculture remaining the same. The increase did not appreciably result from more high schools offering vocational agriculture since 16 were involved in the program in 1961, 1964 and 1967 and 17 in 1970.

1/ It is interesting to note that the percentage of female students has increased from 2.5 percent in 1961 and 1964 to 13.4 percent in 1970.

Graduating classes of 1961, 1964 and 1967 possessed similar agricultural backgrounds. Forty-seven percent were brought up on a farm and 17 percent came from families operating an agricultural enterprise, while in 1970, the proportion was 27 and 13 percent respectively.

Eighty-five percent of the respondents remained in Connecticut for further study and/or employment.

B. Quantitative Analysis

In economic terms, one generally accepted way of determining the practical benefits of education is through analyzing the level of income derived thereafter. One measure of the value of education is the additional amount the economic system is willing to pay for an incremental amount of education. Nevertheless, it is recognized that non-economic factors do exist in any particular job such as working conditions, personal satisfaction[2/] and prestige. Such subjective elements are not considered in this analysis. Any benefits which could be quantified, such as overtime pay, are included in the estimation of current income.

Three statistical methods[3/] were applied to interpret the data, namely, Multiple Regression, Test for Differences between Means, and an Analysis of Variance. The Analysis of Variance using the critical values for the F-distribution, and the Tests for Differences between Means applying the t-statistic, are quantitative methods used to verify significant differences between or among groups. In this study the objective

2/ Consider one respondent who acquired a college degree yet was earning only $2600 in the Peace Corps.

3/ Those interested to pursue in more detail the statistical methods applied may refer to Appendix A on pages 31-33.

is to determine whether significant differences exist between the current incomes of respondents with two years of further education in agriculture compared to those with no additional education, respondents employed in the farm and non-farm sectors, and a comparison of the incomes in each graduating class.

IV. Results

A. Education In and Beyond High School

Around ten percent of the respondents stated that had the vo-ag program not been available, they would have dropped out of high school.

Table 3 summarizes for the four classes of graduates, the major areas of interest in vocational agriculture. Some interesting trends are apparent. The classes of 1967 and 1970 show a marked increase in the proportion of students with major interests in the fields of forestry and natural resources, plant science, landscaping and ornamental horticulture. One plausible explanation for this is the increasing interest in environmental problems. There also has been increased interest in the livestock industry which probably results from the boom in pleasure horses. Specialization in farm mechanics has gone up from five to eleven students between 1967 and 1970.

We expect that trends in areas of interest now underway will continue for some time in the future. This would seem to indicate a re-evaluation of the course offerings and areas of specialization in the vocational agriculture program.

Table 3

Distribution by Major Area of Study in Vocational Agriculture[a/]

Classification of Major Interests	1961	1964	1967	1970	Total
	Number				
1. Crops- Forestry + Natural Resources Conservation	1	4	10	14	29
2. Dairying	19	19	8	9	55
3. Farm Mechanics, Supply + Equipment	1	8	5	11	25
4. General Farming	3	7	6	9	25
5. Livestock Industry	4	10	9	26	49
6. Plant Science, Landscaping + Ornamental Horticulture	2	9	13	23	47
7. Poultry, Egg Science	1	2	3	2	8
8. Veterinary Medicine	0	0	0	2	2
9. Wildlife + Recreation	0	2	1	2	5
10. Food Handling + Processing	0	0	0	1	1
TOTAL	31	61	55	99	246

a/ Classification based on:

1. "Vocational Education in Connecticut", a publication of the Connecticut State Department of Education, Division of Vocational Education.
2. Philip T. Masley, "Curricula Implications for Connecticut--Non-Farm Agricultural Employment", Connecticut State Department of Education, Division of Vocational Education, September 1966.
3. Actual answers by respondents.

Approximately 45 percent of the vocational agriculture students continue their education for one or more years beyond high school. (See Table 4, page 11). Of those continuing, a constantly increasing percentage are majoring in agriculture, a surprising 80 percent of the 1970 class.

Thirteen percent of the graduates of the 1961, 1964 and 1967 classes continued their education by attending a four year college but in 1970 this fell to nine percent.[4/]

Approximately 65 percent continuing education in a four year college program specialized in agriculture. Of those receiving their college degree, 100 percent obtained their first job in agriculture or related industries. Those students currently pursuing a four year college degree in agriculture and employed part-time, are also in a job connected with the farm sector. In addition, over 50 percent of the graduates from the two-year agricultural school at the University of Connecticut are employed in agriculture or related industries.

The foregoing shows that a large majority of those students interested in pursuing an agricultural career at all educational levels, are finding employment in agriculture or related fields. This conclusion at least obtains for their initial employment opportunities.

B. Current Employment and Current Income

The unemployment level for all graduates was exceptionally low. (See Table 5). Eighty-five percent of those who were self-employed or working with their families were in agriculture.

4/ Ninety-four percent of the graduates of the classes of 1961, 1964, 1967 continued their education in the State of Connecticut but only 46 percent of the 1970 class.

Table 4

Educational Status of Respondents Beyond High School

Year of Graduation	Further Education Beyond High School		Major Area of Educational Specialization			
			Agriculture		Non-Agriculture	
	No.	Percent	No.	Percent	No.	Percent
1961	12	39	5	42	7	58
1964	29	50	19	66	10	34
1967	27	50	17	63	10	37
1970	41	43	33	80	8	20

Table 5

Current Employment Status of Respondents

Year of Graduation	Employed	Self-Employed or Working for Family	Unemployed	Military Service	Student
	Number				
1961	27	6	1	0	2
1964	53[a/]	13	2	3	4[b/]
1967	46[a/]	10	2	2	5[b/]
1970	60[a/]	15	6	10	38[b/]
Total	186	44	11	15	49

a/ The number of part-time employed was one, three and 18 for 1964, 1967 and 1970 respectively.

b/ Number of part-time students
1964 -- 2
1967 -- 2
1970 -- 7

Table 6 lists the number of respondents by current income and graduating years. Figures 1 to 4 show the frequency distributions of income for each graduating year.

C. Relationship of Employment to Vocational Agriculture Education

Table 7, page 15, shows the current employment status and respondents by major industry classification. The Bureau of Census classification, upon which the table is based does not accurately reflect the relation of the respondent's job to his high school training in agriculture. In several

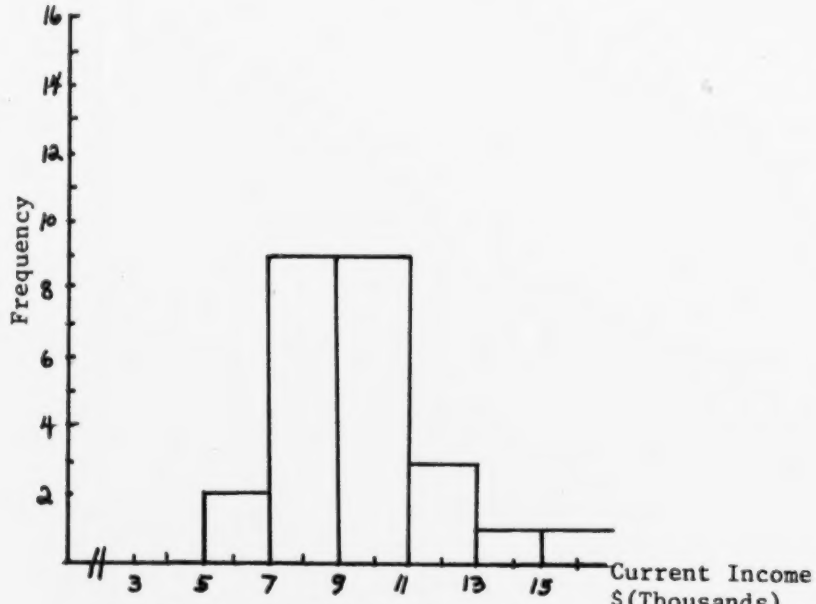
instances, jobs which could be classified as agricultural or its related fields were classified under another category. For example, an individual working in a milk plant was classified under manufacturing, while one selling farm machinery was classified under wholesale and retail trade category.

Table 6

Current (1971-72) Gross Yearly Income of Respondents by Graduation Year and Income Class[a/]

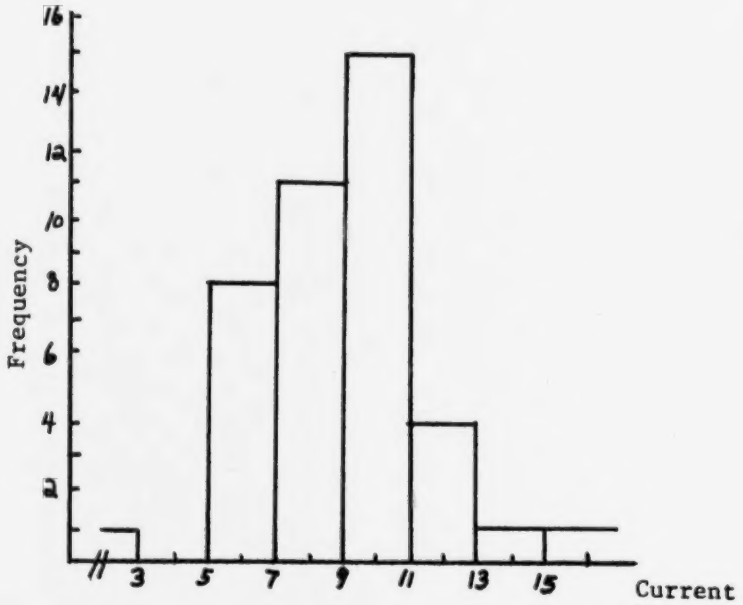
Year of Graduation	Less than 3000	3000-4999	5000-6999	7000-8999	9000-10999	11000-12999	13000-14999	15000 & over	Total
				(Current Dollars)					
1961	0	0	2	9	9	3	1	1	25
1964	1[b/]	0	8	11	15	4	1	1	41
1967	1	4	15	10	7	0	0	3	40
1970	0	13	23	1	1	0	0	0	38
Total	2	17	48	31	32	7	2	5	144

a/ Several respondents did not wish to divulge their present salaries.
b/ With the Peace Corps.



Frequency Distribution for
1961 Graduates

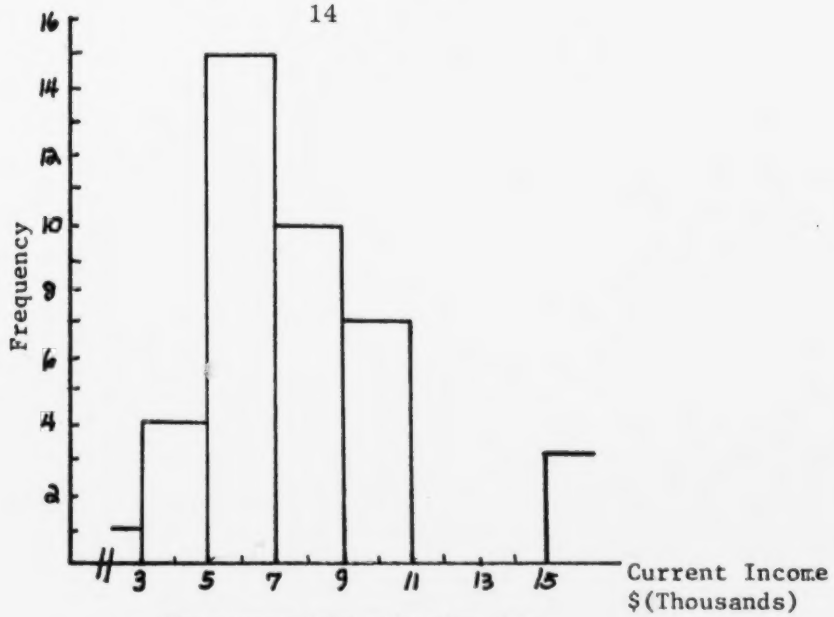
Figure 1



Frequency Distribution for
1964 Graduates

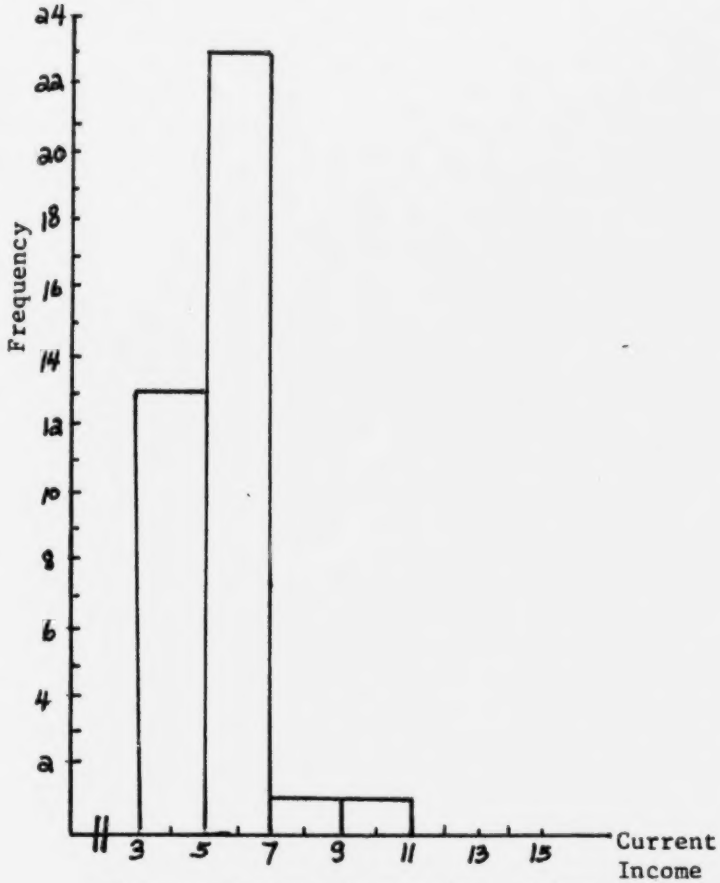
Figure 2

Figure 3



Frequency Distribution for
1967 Graduates

Figure 4



Frequency Distribution for
1970 Graduates

Table 7

Current Employment of Respondents Classified by Major Industry[a/]

		1961	1964	1967	1970	Total
1.	Agriculture, Forestry, Fisheries	3	13	13	25	54
2.	Mining	0	1	1	0	2
3.	Construction	3	9	5	3	20
4.	Manufacturing	10	10	11	6	37
5.	Transportation, Communication + other Public Utilities	3	6	3	0	12
6.	Wholesale + Retail Trade	4	4	1	15	24
7.	Finance, Insurance + Real Estate	0	2	2	1	5
8.	Business + Repair Services	3	2	3	3	11
9.	Personal Services	0	0	1	1	2
10.	Entertainment + Recreational Services	0	0	2	2	4
11.	Professional + Related Services	1	3	2	2	9
12.	Public Administration	0	3	1	2	6
	Total	27	53	45[b/]	60	186

a/ Based on the 1970 Bureau of the Census Classification.
b/ If Tables 5 and 7 are compared, a discrepancy of 1 unclassified respondent will show for 1967 in the employment category.

In designing the questionnaire, it was anticipated that the Bureau of Census' classification would not account for all the related fields. To offset this possibility, the following question was included in the questionnaire: "How related is your present job to your vocational agriculture schooling?". For purposes of statistical analysis, only the answers "Related" and "Not Related" were considered. A respondent who stated "Somewhat Related" was classified under one of the two headings depending on how close his job was connected with agriculture. Therefore, Table 8 probably more closely assesses the relationship of the vocational agriculture program and employment than does the census classification.

Table 8

Respondents' Opinion as to the Relationship of Their Current Employment Status with Their Vo-Ag Education a/

Year of Graduation	Related Employment	Not Related Employment
	Percent	
1961	19	81
1964	35	65
1967	38	62
1970	52	48

a/ In the first year of employment for all the 4 graduating years, approximately 50 percent started out in an area related to their agricultural education.

The longer a graduate is away from school, the higher the probability that he will not be employed in the farm sector. As is true of other fields, the longer the length of employment, the less likely one is to be employed in his original field of specialization.

Table 9

Farm Employment in the U. S. and Selected Regions[a/]

	Connecticut	New England	United States
		(thousands)	
1961	24	132	6,919
1964	22	116	6,110
1967	14	87	4,903
1970	13	73	4,523

a/ Agricultural Statistics, U. S. Department of Agriculture, 1963, 1965, 1968 and 1971.

D. Statistical Data and Interpretations

1. Multiple Regression

In trying to explain the variation in income, six possible explanatory variables were considered in a multiple regression analysis, as follows:[5/]

1) Years in vocational agriculture.

2) Years worked after high school.

5/ The elements of education and employment which determine income level were the criteria used in selecting the independent variables. It was also felt that years of Military Service might explain some differences in income levels.

3) Farm vs. non-farm employment.

4) Years of military service.

5) Years of further education in agriculture.

6) Years of further education in non-agricultural fields.

Seventeen (17) combinations of the six variables were tested with the intent of verifying the extent to which the variation of the dependent variable income, was associated with variation of the independent variables. Critical values of the F-distribution and the R^2 were evaluated[6/] to determine the significance of the regression. The t-test was conducted to determine the significance of each regression coefficient. The F-test considers all the coefficients of the variables simultaneously affecting one another while the t-test treats each one separately. The latter will indicate if there is a tendency of the dependent variable and any of the independent variables to habitually move together. The sign of the coefficient will also denote whether the correlation between the explanatory variable(s) and income is direct or inverse.

The F-test for all the 17 combinations of the independent variables did not yield significant results[7/]. In addition, the R^2's, which measure the amount of income variation explained by the variation in the independent variables, were all extremely low. The highest R^2 obtained was just over 27.

6/ Refer to Appendix A, pages 31-33.
7/ At the five percent level of significance.

The t-test for significance of coefficients on the other hand, produced some important results which are summarized in Table 10. The positive and negative signs before the X's show the direction in which income and the explanatory variables move together. The numbers within the brackets signify the year of the graduating class.[8/]

The coefficients of X_3 (farm or non-farm employment), X_5 (years of further education in agriculture), and X_6 (years of further education in non-agriculture) were found to be significant.[9/] It implies that non-farm employment and education beyond high school are directly related with higher levels of income.

Coefficients of the other three variables were not found to be conclusive enough to warrant any prediction. The coefficient for X_1, number of years in vocational agriculture, could not aid in explaining variations in income.

The X_2 variable, number of years worked after high school, was expected to be associated with increases in salary. However, this variable is subject to influence from other factors such as further education and type of current employment.

8/ $-X_3(1)$ would therefore read as follows: The X_3 variable is significant for 1961 with a negative sigh in its coefficient.

9/ The term "significant" unless otherwise stated, refers up to the ten percent level.

Table 10

Multiple Regression Analysis--Tests of Significance[a/]

Combination of Variables	Significant at .05	Significant at .10
X_1 X_2 X_3 X_4 X_5 X_6	$-X_3(1)$	$-X_3(7)$
X_1 X_3 X_5	$-X_3(1)$	$-X_3(7)$ $+X_5(1)$
X_1 X_3		
X_1 X_5		
X_3 X_5	$-X_3(1)$	$-X_3(7)$ $+X_5(1)$
X_1 X_2 X_3 X_6		$+X_6(4)$
X_2 X_3 X_6		$-X_3(1)$ $+X_6(4)$
X_2 X_3 X_5 X_6	$-X_3(1)$ $+X_6(4)$	$-X_3(7)$ $+X_5(1)$
X_2 X_3		$-X_3(1)$
X_2 X_6	$+X_6(4)$	$+X_6(1)$
X_3 X_6		$+X_6(4)$
X_3 X_5 X_6	$-X_3(1)$	$+X_5(1)$ $+X_6(4)$
X_2 X_3 X_4	$-X_3(1)$	
X_3 X_4		$-X_3(1)$ $-X_3(7)$
X_3 X_4 X_5	$-X_3(1)$	$-X_3(7)$ $+X_5(1)$
X_3 X_5	$-X_3(1)$	$-X_3(7)$ $+X_5(1)$
X_3		$-X_3(1)$

a/ For 1970 only 2 combinations were used, one, X_1 and X_3 and two, X_3 because the graduates have not been away from school long enough.

The number of years in Military Service, X_4, probably would explain income only to the extent that military training and education were related to present employment. This did not appear to be the situation.

2. The Test for Differences Between Means

The t-statistic was used to test whether the mean salaries received between any two groups were significantly different. The first comparison was made between those with two years of further education in agriculture and those without additional education. It was hypothesized that the former would receive higher salaries.

The mean salaries between the two groups were compared in the years 1964 and 1967[10/]. At the 10 percent level of significance, the conclusion was reached that any apparent differences between the two groups were due to chance fluctuation. In other words, the mean salaries were not significantly different.

These results need to be clarified for they are not inconsistent with the earlier conclusion, namely, that further education is positively correlated with income. Other things were held equal in analyzing the mean salaries of the two groups except the type of employment (farm or non-farm) to which the respondents belonged. This was done in order to obtain a sufficiently large sample. It was observed that many respondents who had two years of post-secondary schooling in agriculture were usually employed in the farm sector. On the other hand, those who

10/ Sufficient observations were lacking in 1961. Graduates for 1970 had not been away from school long enough to make comparisons.

received training only in high school, were usually employed in the non-farm sector. Recall the X_3 variable in the regression analysis which brought out the fact that respondents in the non-farm employment are receiving more pay than those in farm employment. Despite the failure of the t-statistic to show any significant differences in the mean salaries of the two groups, the computed t-values were positive. This means that further education is positively related to higher incomes.[11/]

The second comparison was made between the groups employed in the farm and non-farm sectors. It was hypothesized that the latter, as shown by the multiple regression results, would be receiving higher pay. Analyzing the groups of 1967 and 1970[12/], the calculated t-statistic for both years was significant but only at the 15 percent level. The rather low level of significance, would seem to support the hypothesis that those employed in the non-farm sector receive no higher incomes than those in the farm sector. Yet, it is a well-known fact that per capita disposable income from all sources has been for many years, favorable to the non-farm sector.

3. Analysis of Variance

Ordinarily, it is expected that an earlier graduating class would be receiving more pay than subsequent classes simply because of the longer employment period. A one-factor Analysis of Variance[13/] confirmed that significant differences in salaries did exist between the four graduating groups. Table 11 lists the interval estimates between the four graduating years.

11/ Also refer to Appendix A, page 32.
12/ 1961 and 1964 lacked sufficient observations.
13/ Refer to Appendix A, page 32, for further details.

Table 11

Income Differences in Population Means $(u_i - u_I)$ Estimated from Sample Means $(\bar{X}_i - \bar{X}_I)$. 95% Level of Confidence in All Interval Estimates

i \ I	1961	1964	1967	1970
1961	0	[-590;1702]	[564;3238]	[3243;4946]
1964		0	[175;2515]	[495;2195]
1967			0	[1176;3210]
1970				0

A respondent who graduated in 1961 would be receiving up to $1702 more or $590 less than compared to a respondent from the 1964 class. The table would read accordingly for the rest of the years. Except for 1961, all the intervals are complemented with positive signs. This means that additional years after graduation are associated with high incomes.

V. Future Farmers of America

The Future Farmers of America (FFA) was organized in November 1928 as the national organization of, by, and for boys[14/] studying vocational agriculture in high school. It is a non-profit, non-political, non-sectarian farm youth organization designed to promote leadership. Although voluntary in membership, around 90 percent of the respondents were FFA members. Asked their opinion concerning the value of FFA to them, most of the respondents replied in the affirmative, except for the 1970 class.[15/]

14/ In 1969, at the annual FFA meeting in Kansas City, a resolution was passed allowing girls for the first time, to be FFA members on a national basis.

15/ Refer to Part VI on Personal Interviews for further details.

A surprising twenty-one percent of the 1970 respondents replied that FFA was of no value to them. The FFA program may require some revision to continue receiving wholehearted support of vo-ag students.

VI. Personal Interviews and Results of Open-End Questions on Questionnaire

A total of 20 personal interviews were conducted to obtain additional information on the students' evaluation of the program. Students were generally satisfied with their vocational agriculture curriculum. The extensiveness and practical application of subjects differed materially among schools. Some students suggested more practical application in courses offered. Others suggested increased offerings in areas such as Natural Resources Conservation.

In response to the question: "What has your vocational agriculture education meant to you?", the following are some quotes:

"... made me realize small farming is becoming obsolete and aware of the huge expenses involved in running a farm."

"... not much because I had to continue my schooling for another two years in a private prep school to change my program back to straight college."

"... meant much in high school but my present job is not related to it because of insufficient capital to start a farm."

"... better understanding and practical knowledge of livestock which has greatly helped in my job."

"... can help a lot especially if the school like the one I went to, gives you an opportunity to work a certain number of hours on the farm as part of the curriculum."

"... It was a course of decision-making regarding the field of agriculture I was to go into."

"... some students take it because it is an easy though interesting course."

"I took high school quite seriously. Enrolled in vo-ag subjects and the required courses in English and U. S. History plus additional subjects like Science and Mathematics. This qualifies me, more or less, for any college education I wish to pursue and gives me the edge over other graduates who have not taken advantage of these opportunities."

It would seem that the ideal vo-ag graduate is exemplified by the last quote.

In line with the preceding quotes, the over-all response to the value of education received is tabulated in Table 12.

Table 12

Respondents' Evaluation of the Value of Vo-Ag[a/]

Year of Graduation	Favorable	Unfavorable	No Comment
	Percent		
1961	75	11	14
1964	71	11	18
1967	86	2	12
1970	90	2	8

a/ Based upon the mail questionnaire.

In addition to a general evaluation of the vo-ag program, the interviews touched on other educational issues. The two year school of agriculture program beyond high school received considerable attention.

Two main topics were discussed. First was the fact that no entrance requirements are specified for those entering the two-year program at the University of Connecticut. Therefore, persons who had no vocational agriculture training while in high school, could be enrolled in this post-secondary school. Some respondents suggested vo-ag be made an entrance requirement. Second, the University of Connecticut awards only a certificate upon graduation from the Ratcliffe Hicks two-year school. Some of the interviewees felt an associate degree should be conferred. This, they argued, would more readily permit graduates of the two-year program to transfer to a four-year school of their choice.

The FFA was another major item of discussion. Many of the 1970 sample who felt the FFA was not valuable described it as "growing so large in membership as to lose its personal identity". The respondents emphasized that the FFA did not give sufficient attention to such important issues as conservation, natural resources use and pollution problems. Others interviewed thought those who did not consider the FFA meaningful were not interested enough to know about or participate in the activities of the organization.

Other main points brought out by the open-ended questions were as follows:

1) More information should be provided to prospective students regarding the vocational agriculture program.

2) Strengthen the program in such a way as to "weed out" uninterested students who enroll in vo-ag merely to get through high school.

3) Provide better counselling to the vo-ag students regarding the opportunities in agriculture.

4) Provide better equipment and modernized facilities.

VII Summary and Conclusions

Data on income, education and employment were obtained from high school vocational agriculture graduating classes of 1961, 1964, 1967 and 1970.

Enrollment in vocational agriculture has doubled from 1961 to 1970.

For those continuing education beyond high school, the two year School of Agriculture at the University of Connecticut has been popular. A majority of the graduates of this program have initially found employment in the agricultural sector. As time progresses, however, they gradually find employment in other job classifications. Vo-ag students do have criticisms of the two-year program, namely, no specific entrance requirements and no associate degree awarded.

Approximately 10 percent of the vo-ag graduates continue their education at a four-year college. This is not surprising since the vo-ag program is largely designed for those who plan on terminating their formal education upon graduation from high school. About 65 percent of those who do continue at a four-year college specialize in agriculture, and 100 percent of those graduating found employment in agriculture or related

industries.[16/] Education beyond high school was found to be positively correlated with the level of income.

The unemployment rate for the total sample was satisfactorily low.

In classifying the jobs of the respondents according to industries, two bases were used, namely, the 1970 Bureau of the Census and the opinion of the graduates regarding the relationship of their employment to agriculture. For 1970 graduates, 41 percent found employment in agriculture based on the Bureau of Census classification, while 52 percent of the same respondents stated they were employed in agriculture.

The following variables were found to be significantly related to higher levels of income:

1) X_3 Farm and Non-Farm employment.

2) X_5 Years of Further Education in Agriculture.

3) X_6 Years of Further Education in Non-Agriculture.

The tests for differences between means did not support the hypothesis that the mean salaries of persons employed in the non-farm sector were higher than those working on the farm although the regression analysis did. The regression analysis is probably the better indicator since it holds other variables constant while estimating the effect of farm vs. non-farm employment.

16/ Those currently enrolled in college and working part-time were included.

An Analysis of Variance substantiated the fact that differences in salaries prevailed between respondents according to the different years they graduated. There is a positive return to experience amounting to as much as $1,000 per year.

Most of the students value the incentives and opportunities FFA has provided for them. However, an increasing number of the respondents in 1970, 21 percent, felt that the FFA's increased membership has lost communication with the individual person, and that the organization has ignored new fields related to agriculture.

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[6] Kane, Edward J., Economic Statistics and Econometrics, Harper & Row, N. Y., Evanston & London, 1968, p. 212 and Chapter 11.

[7] Masley, Philip T., "Curricula Implications for Connecticut -- Non-Farm Agricultural Employment," Connecticut State Department of Education, Division of Vocational Education, September, 1966.

[8] Ostle, Bernard, Statistics in Research, Iowa State University Press, 1969, Chapter 7.

[9] Wonnacott & Wonnacott, Introductory Statistics, John Wiley & Sons, N. Y., 1969, Chapter 10.

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APPENDIX A

A. Statistical Notes

1. Multiple Regression

Our Model

Assuming a linear relationship between current income and the independent variables, we have the equation:

$$Y = a + b_1X_1 + b_2X_2 + \ldots b_6X_6 + u$$

where a = parameter denoting intercept

$b_i (i = 1, 2, \ldots, 6)$ = coefficients of the independent variables

u = statistical errors of measurement, human indeterminancy and specification.

X_3 is a dummy variable and takes on the value of 1 for respondent in farm employment and the value of 0 for respondent in non-farm employment.

The single equation is therefore equivalent to the following two equations:

(farm employment) $$Y = a + b_1X_1 + b_2X_2 + b_3 + b_4X_4 + b_5X_5 + b_6X_6 + u$$

(non-farm employment) $$Y = a + b_1X_1 + b_2X_2 \quad + b_4X_4 + b_5X_5 + b_6X_6 + u$$

The critical values for the F distribution measures the significance of any regression.

The R^2, known as the "coefficient of multiple determination",[17] calculates the percentage of the variation in income explained by the variation of the independent variables.

17/ Kane, Edward J., Economic Statistics and Econometrics, Multiple Regression, Harper & Row, N. Y., Evanston & London, 1968, Chapter 11.

To evaluate the significance of each coefficient, the t-test is used. In simple regression, the F value is equal to t^2. However, multiple regression requires a more exacting process of breaking-up the Sum of Squares in order to make any assumptions regarding the relationship between the F- and t-test.[18/]

2. Test for Differences Between Means

Following are the formulas that were used:[19/]

$$t(\text{statistic}) = \frac{(\bar{X}_1 - \bar{X}_2)}{S_\Delta} \qquad S_\Delta = \sqrt{\frac{(N_1-1)S_1^2+(N_2-1)S_2^2}{N_1+N_2-2}} \sqrt{\frac{N_1+N_2}{N_1N_2}}$$

We merely compare the calculated "t" value to: t_α, N_1+N_2-2 to come up with any conclusions whether the means are significantly different.

3. Analysis of Variance

An Anova table is used to measure the critical value of the F distribution.

One-Factor Analysis of Variance (ANOVA)[20/]

	Sum of Squares	Degrees of Freedom	Mean Sum of Squares	F Ratio
Between groups; Explained by differences in $\bar{X}_i$	$SS_R = \sum_{i=1}^{g} \frac{G_i^2}{n_i} - \frac{T^2}{\sum_{i=1}^{g} n_i}$	$(g-1)$	$SS_R/g-1$	$\frac{MSS_R}{MSS_e}$
Within groups; residual variation, resulting from chance fluctuation	$SS_e = \sum_{i=1}^{g} \sum_{j=1}^{n_i} (X_{ij}-\bar{X}_i)^2$	$\sum_{i=1}^{g} (n_i-1)$	$SS_e / \sum_{i=1}^{g} (n_i-1)$	

18/ It is possible therefore, as was in the case in this study, for the F-test to be insignificant and the t-test significant.

19/ Kane, Edward J., Economic Statistics and Econometrics, Harper & Row, N. Y., Evanston & London, 1968, p. 212.

20/ ANOVA formulas for unequal numbers of observations in each group were derived and synthesized from (1) Wonnacott & Wonnacott and (2) Ostle.

where: g = number of groups

e = unexplained variation

G_i = total of the observation in the ith group = $\sum_{j=1}^{n_i} X_{ij}$

T = grand total $\sum_{i=1}^{g} \sum_{j=1}^{n_i} X_{ij}$

Degrees of freedom was calculated to be F^3_{139}.

The formulas for interval estimates are as follows:

$$(u_1 - u_2) = (\bar{X}_1 - \bar{X}_2) \pm t.025 \; S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$ (at the 95% confidence interval)

where: $n_1 + n_2 - 2$ is our degrees of freedom

u_1, u_2 = population means

$$S_p^2 = \frac{1}{(n_1+n_2-2)} \left[\sum_{i=1}^{n_1} (X_{1i} - \bar{X}_1)^2 + \sum_{i=1}^{n_2} (X_{2i} - \bar{X}_2)^2 \right]$$

APPENDIX B

AN INTENSIVE FOLLOW-UP STUDY OF
CONNECTICUT AGRICULTURE GRADUATES OF
THE CLASSES OF 1961, 1964, 1967 and 1970

PLEASE TYPE OR PRINT YOUR ANSWERS IN INK.

I. IDENTITY INFORMATION

1. NAME _____
LAST (HUSBAND'S) FIRST MIDDLE (MAIDEN)

SEX [ ] MALE (1) [ ] FEMALE (2)

2. PRESENT ADDRESS:

STREET _____ CITY _____

COUNTY _____ STATE _____

TEL. _____ AREA CODE _____
(If you are a Connecticut Resident)

3. IN WHAT STATE OR COUNTRY WERE YOU BORN _____

4. YEAR GRADUATED FROM VO-AG _____

FROM WHAT HIGH SCHOOL _____

YEARS OF VOCATIONAL AGRICULTURE IN HIGH SCHOOL _____

5. MAJOR COURSE OR AREA OF INTEREST IN VOCATIONAL AGRICULTURE WHILE IN HIGH SCHOOL: _____

6. CHECK ANY OF THE FOLLOWING IF APPLICABLE

_____ I WAS BROUGHT UP ON A FARM

_____ MY FAMILY OWNS AND/OR OPERATES AN AGRICULTURE-RELATED BUSINESS (NURSERY, FEEDS, FARM EQUIPMENT, ETC.)

_____ MY FAMILY WAS NOT DIRECTLY OR INDIRECTLY CONNECTED WITH AGRICULTURE

7. FATHER'S OCCUPATION _____

II. WORK EXPERIENCE: LIST ALL PAST AND PRESENT POSITIONS CONCERNING EMPLOYMENT, ON THE JOB TRAINING, OR PART TIME WORK BEGINNING WITH THE FIRST POSITION HELD AFTER GRADUATION FROM HIGHSCHOOL (INCLUDE ANY UNEMPLOYMENT PERIOD AND MILITARY SERVICE) SEQUENCE OF DATES IS ESSENTIAL

(REFER TO EXAMPLE ATTACHED)

FROM TO (MONTH AND YEAR)	NAME & LOCATION OF EMPLOYER (IF UNEMPLOYED, STATE:UNEMPLOYED)	TYPE OF WORK (IF DIFFERENT POSITIONS WERE HELD UNDER ONE EMPLOYER, PLEASE LIST INDIVIDUALLY) IF UNEMPLOYED, GIVE CIRCUMSTANCE OR REASON	REPORT GROSS SALARY BY HR. WEEK, MONTH OR YEAR WHICHEVER IS APPLICABLE. (YEARLY GROSS PREFERRED)	WEEKLY BENEFITS (IF UNEMPLOYED)	REGULAR HOURS WORKED PER WEEK
			Starting $___ per _____ Ending $___ per _____		
			Starting $___ per _____ Ending $___ per _____		
			Starting $___ per _____ Ending $___ per _____		
			Starting $___ per _____ Ending $___ per _____		
			Starting $___ per _____ Ending $___ per _____		
			Starting $___ per _____ Ending $___ per _____		
			Starting $___ per _____ Ending $___ per _____		

III. CURRENT EMPLOYMENT (PLEASE EXPAND ON PRESENT POSITION HELD)

1. ARE YOU WORKING _____ FULL TIME (1) _____ PART TIME (2)

2. IF PART TIME, ARE YOU ATTENDING SCHOOL _____ YES (1)

_____ NO (2)

IF YES, PLEASE STATE NAME AND PLACE OF SCHOOL AND COURSE WORK

_____

EXPECTED DATE OF COMPLETION FROM SAID COURSE _____

3. CURRENT EMPLOYER (NAME AND ADDRESS OF FIRM)

_____

_____

ARE YOU RELATED TO YOUR EMPLOYER _____ YES (1)

_____ No (2)

4. TYPE OF BUSINESS _____

CURRENT JOB TITLE _____

CURRENT EMPLOYMENT DUTIES _____

5. IF YOU WORK OVERTIME, APPROXIMATE NO. OF OVERTIME HOURS A WEEK _____

GROSS ANNUAL SALARY $_____

6. LIST OTHER SOURCES OF INCOME (IF ANY)

1.

2.

3.

ESTIMATED TOTAL NET EARNINGS A YEAR FROM ALL SOURCES $_____

7. HOW RELATED IS YOUR PRESENT JOB TO YOUR VOCATIONAL-AGRICULTURE TRAINING?

_____ CLOSELY RELATED (1) _____ SOMEWHAT RELATED (2)

_____ UNRELATED (3)

IF PRESENT JOB IS UNRELATED TO YOUR AGRICULTURAL TRAINING, IS THERE ANY REASON WHY YOU ARE NOT PURSUING AN AGRICULTURAL RELATED OCCUPATION

_____

8. NUMBER OF YEARS IN MILITARY SERVICE _____

IV. EDUCATION SINCE HIGH SCHOOL GRADUATION
LIST ANY HIGHER EDUCATION SINCE HIGH SCHOOL:

1.	NAME AND PLACE OF SCHOOL	MAJOR PROGRAM AREA	FROM TO	CERTIFICATE, DEGREE
	1.			
	2.			
	3.			
	4.			

2. DO YOU INTEND TO PURSUE FURTHER SCHOOLING _____ YES (1) _____ NO (2)

IF YES, GIVE MAJOR FIELD _____

3. CHECK ANY OF THE FOLLOWING IF YOU ARE NOT OR DO NOT INTEND TO PURSUE FURTHER SCHOOLING.

LACK OF FUNDS _____

LACK OF TIME _____

OTHER REASONS _____

NO SPECIFIC REASON _____

_____

_____

4. DID YOU BELONG TO FFA (FUTURE FARMERS OF AMERICA) _____ YES (1)

_____ NO (2)

IF YES, DID YOU CONSIDER IT VALUABLE _____ YES (1)

_____ NO (2)

5. IF VO-AG PROGRAM HAD NOT BEEN AVAILABLE TO YOU, WOULD YOU HAVE COMPLETED HIGH SCHOOL

_____ YES (1) _____ NO (2)

V. EVALUATION OF EDUCATION AND TRAINING RECEIVED:

1. LIST VO AG SUBJECTS IN HIGH SCHOOL WHICH YOU THINK HAVE BEEN MOST USEFUL TO YOU SINCE GRADUATION.

1.

2.

3.

4.

5.

2. WHAT HAS YOUR VOCATIONAL AGRICULTURE EDUCATION MEANT TO YOU?

3. WHAT SUGGESTIONS DO YOU HAVE FOR IMPROVEMENT OF THE VOCATIONAL AGRICULTURE PROGRAM.

VI. GENERAL INFORMATION

PLEASE LIST ANY PUBLIC SERVICE ACTIVITIES OR ORGANIZATIONS WITH WHICH YOU ARE AFFILIATED. (LIST TOWN BOARDS, ROTARY, BOY SCOUTS, ETC.)

LIST ANY SPECIAL HOBBIES PURSUED _____

_____

_____

LIST ANY SPECIAL AWARD, RECOGNITION, ETC. ACHIEVED DURING AND SINCE HIGH SCHOOL GRADUATION. _____

_____

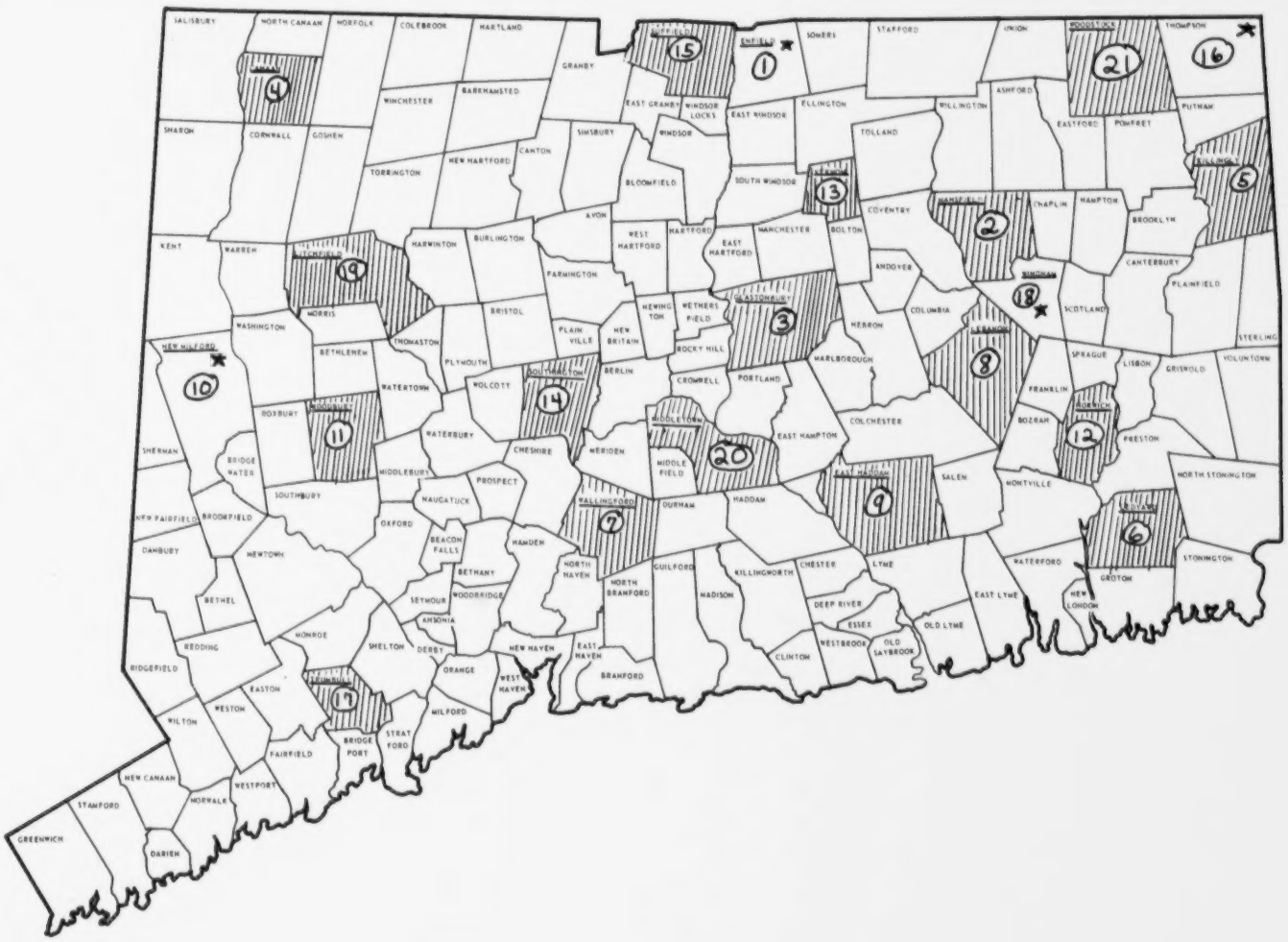
_____

EXAMPLE

II. WORK EXPERIENCE: LIST ALL PAST AND PRESENT POSITIONS CONCERNING EMPLOYMENT, INCLUDING ON THE JOB TRAINING, OR PART TIME WORK BEGINNING WITH THE FIRST POSITION HELD AFTER GRADUATION FROM HIGHSCHOOL. (INCLUDE ANY PERIOD OF UNEMPLOYMENT AND MILITARY SERVICE) SEQUENCE OF DATES IS ESSENTIAL

FROM TO (MONTH AND YEAR)	NAME & LOCATION OF EMPLOYER (IF UNEMPLOYED, STATE:UNEMPLOYED)	TYPE OF WORK (IF DIFFERENT POSITIONS WERE HELD UNDER ONE EMPLOYER, PLEASE LIST INDIVIDUALLY) IF UNEMPLOYED, GIVE CIRCUMSTANCE OR REASON	REPORT GROSS SALARY BY HR. WEEK, MONTH OR YEAR, WHICHEVER IS APPLICABLE. (YEARLY GROSS PREFERRED)	WEEKLY BENEFITS (IF UNEMPLOYED	REGULAR HOURS WORKED PER WEEK
MAR1962 DEC1963	SMITH & SMITH DAIRY FARMS, INC. STORRS, CONN.	ICE-CREAM PLANT FOREMAN	STARTING $3.10 per HOUR ENDING $3.30 per HOUR		40 40
DEC1963 DEC1964	"	ICE-CREAM PLANT MANAGER	STARTING $7,500 per YEAR ENDING $7,500 per YEAR		40 40
DEC1964 FEB1965	UNEMPLOYED	LAID-OFF	STARTING $____ per ____ ENDING $____ per ____	$60.00	
FEB1965 MAR1967	U.S. GOV'T (MILITARY SERVICE)	AIR FORCE STARTED AS PRIVATE ENDED AS CORPORAL	STARTING $80.00 per MONTH ENDING $120.00 per MONTH		40 40
MAR1967 JUL1968	MCDONALD'S HAMBURGERS///WILLIMANTIC, CONN.	(PART-TIME) CASHIER	STARTING $2.80 per HOUR ENDING $3.00 per HOUR		20 20
JUL1968 AUG1970	PETERSON FARMS, INC., WHITE PLAINS NEW YORK	ASST. VICE PRES. FOR SALES	STARTING $250.00 per WEEK ENDING $300.00 per WEEK		40 40
AUG1970 TO PRESENT	SMITH DAIRY BAR	OWNER	STARTING $9,000 NET EARNINGS ENDING APPROXIMATE FOR ONE YEAR		40 38

* HIGH SCHOOL VOCATIONAL AGRICULTURE INSTITUTIONS FROM 1961-70 (STATE OF CONNECTICUT)



1. Enfield High School
2. E. O. Smith High School
3. Glastonbury High School
4. Housatonic Valley Regional
5. Killingly High School
6. Ledyard High School
7. Lyman Hall High School
8. Lyman Memorial High School
9. Nathan Hale-Ray
10. New Milford High School
11. Nonnewaug Regional
12. Norwich Free Academy
13. Rockville High School
14. Southington High School
15. Suffield High School
16. Tourtellotte High School
17. Trumbull High School
18. Windham High School
19. Wamogo Regional High School
20. Woodrow Wilson High School
21. Woodstock Academy

* Star means program discontinued by institution.